53rd ATBC 2016

Annual Meeting of the Association for Tropical Biology and Conservation

19-23 June 2016
Le Corum, Montpellier - France

Tropical Ecology and Society
Reconciliating Conservation and Sustainable Use of Biodiversity

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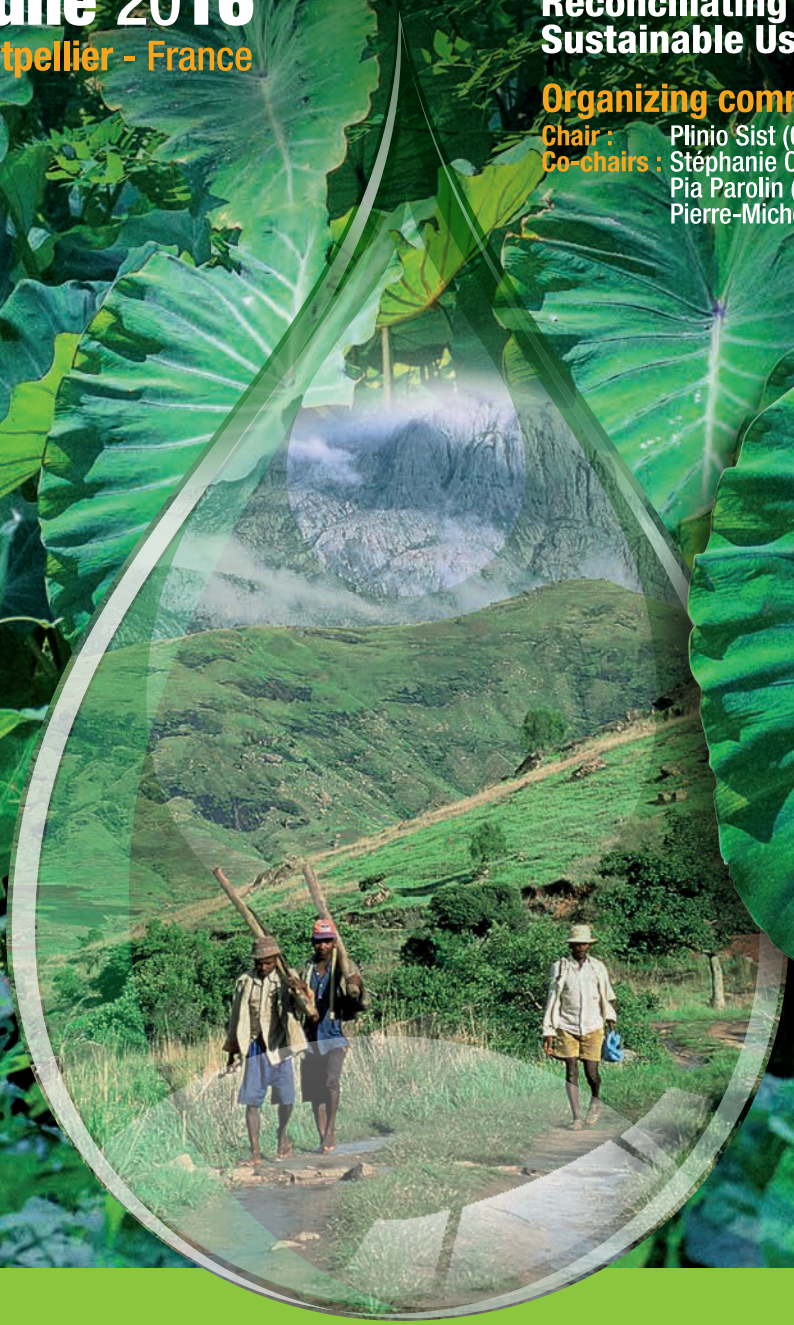

PROGRAM & ABSTRACTS

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O34-12 – S34 *Free session:Tropical forest ecology, conservation and management*
Wednesday 22 June / 10:00-15:30 – Einstein

Climate seasonality limits leaf carbon assimilation and wood carbon storage in tropical forests

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The seasonal climate drivers of the carbon cycle in tropical forests remain poorly known, although these forests account for more carbon assimilation and storage than any other terrestrial ecosystem. Based on a unique combination of seasonal pan-tropical data sets from 89 experimental sites (68 include aboveground wood productivity measurements and 35 litter productivity measurements), their associate canopy photosynthetic capacity (enhanced vegetation index, EVI) and climate, we ask how carbon assimilation and aboveground allocation are related to climate seasonality in tropical forests and how they interact in the seasonal carbon cycle. We found that canopy photosynthetic capacity seasonality responds positively to precipitation when rainfall is < 2000 mm per year (water-limited forests) and to radiation otherwise (light-limited forests); on the other hand, independent of climate limitations, wood productivity and litterfall are driven by seasonal variation in precipitation and evapotranspiration respectively. Consequently, light-limited forests present an asynchronism between canopy photosynthetic capacity and wood productivity. Precipitation first-order control indicates an overall decrease in tropical forest productivity in a drier climate.

O35-01 – S35 *Plant diversity and endemism in the western ghats-sri lanka biodiversity hotspot: past, present and future*
Wednesday 22 June / 16:00-17:30 – Einstein

Influence of past and present environmental heterogeneity on the ecology and biogeography of Western Ghats endemic tree species

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Background: Environmental heterogeneity in the Western Ghats (WG) is expected to drive both the assembly of endemic trees in extant assemblages and their long-term evolutionary dynamics. We addressed how (i) ecological strategies of endemic trees vary along current environmental gradients, (ii) environmental variations have shaped species' distributions during the last glacial cycle, and (iii) their phylogenetic diversity varies across geographical and ecological space, under the influence of evolutionary processes.
Methods: We assessed species' traits related to reproduction, dispersal, and competitive ability, and characterized species potential distributions in present and past (Last Interglacial, LIG, Last Glacial Maximum, LGM) climatic conditions. We evaluated the extent of potential distribution changes through time, as a testimony of past pressures for migration, niche change or ecological plasticity. We quantified the phylogenetic diversity of endemic trees in mesoscale assemblages, which was expected to be lower in more stressful environments. We also tested the phylogenetic turnover of these assemblages with regard to geographic and environmental distances.
Results: We identified three distinct scenarios of species' responses to Quaternary climate changes– stability, contraction and shift. For high-elevation species, the cool, dry LGM was less restrictive than for medium-elevation and northern lowland species. Higher LIG seasonality restricted species requiring minimal seasonality. Phylogenetic diversity varied according to seasonality and historical climate stability, and was lower under longer dry seasons. The overall positive phylogenetic turnover was driven by annual rainfall and elevation gradients, but not space. High-elevation endemics were phylogenetically distinctive along the elevation gradient.
Conclusions: The results concur to highlight the key role of environmental gradients in the biogeography and ecology of WG endemic trees. Palaeoclimate modelling reveals the likely local persistence of most endemics over the last 120 kyr, and their large spectrum of bioclimatic preferences reflect pre-Quaternary evolutionary events. Analyses of phylogenetic diversity further points to lower diversity in stressful conditions, which may reflect functional convergence. An abrupt change in phylogenetic turnover along the elevation gradient underlines the distinct biogeographic and evolutionary backgrounds of low- and high-elevation species pools.